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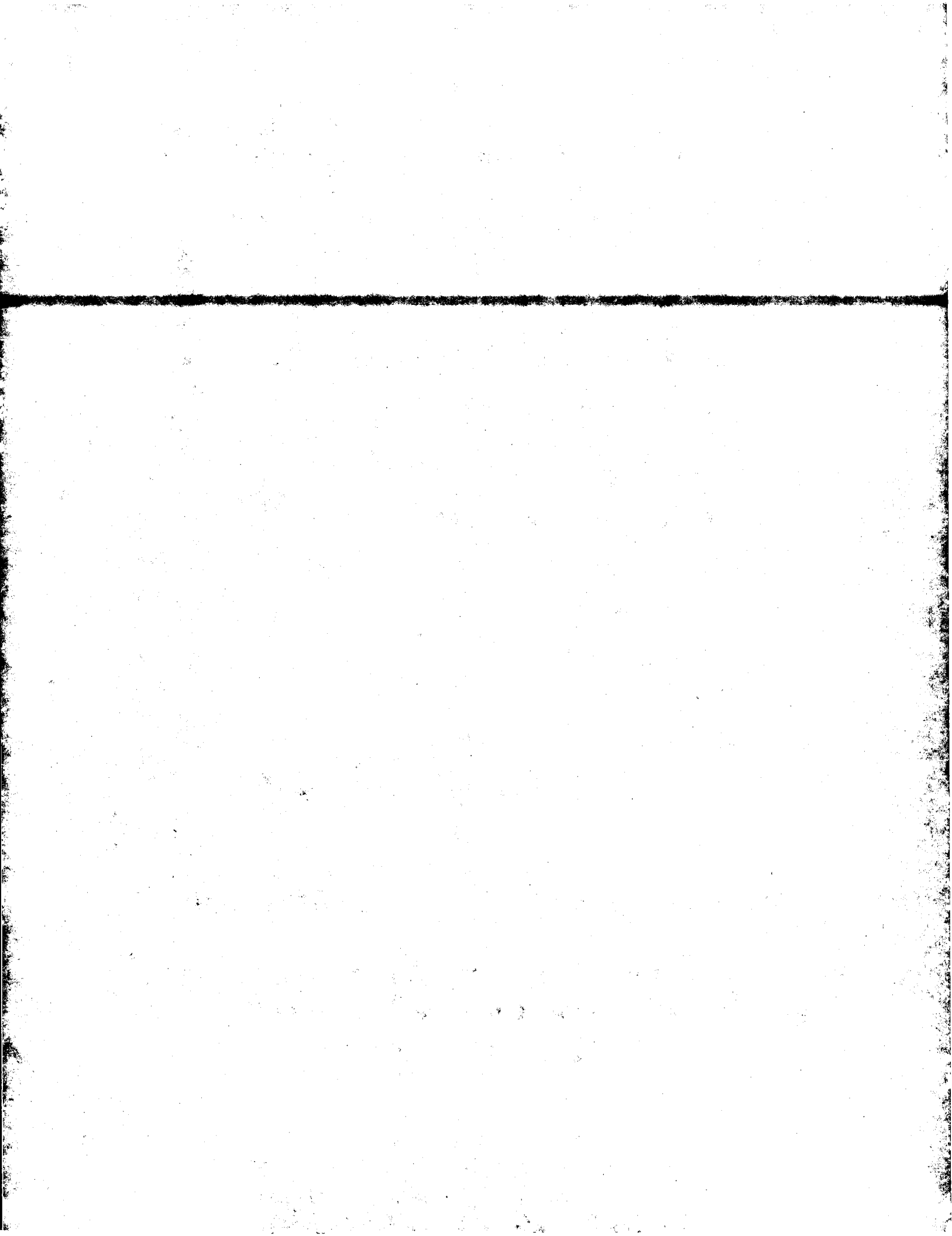
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# PATENT SPECIFICATION

762,323

Inventor :—THOMAS GRANT.



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Index at Acceptance :—Class 99(2), A2(B1 : C1 : C6 : C7).

## COMPLETE SPECIFICATION.

### Improvements in or relating to Soot Blowers for Steam Generators.

We, COCKBURNS LIMITED, a British Company, of Clydesdale Engineering Works, Cardonald, Glasgow, S.W.2, do hereby declare the invention, for which we pray

5 that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement :—

10 This invention relates to improvements in soot blowers for steam generators and has for an object to provide an improved construction of soot blower devised to operate with economy in steam consumption.

15 A soot blower according to the invention includes a projectile and retractile nozzle-head wherein, in the operation of the blower, a substantial flow of air induced into the steam flow through the head, for admixture therein with the steam, and for discharge therewith

20 from the nozzle-head.

The blower may include an externally flanged tubular body within which is guided, for axial advancing and retracting movements, a tube carrying on its forward end

25 the nozzle-head, which latter is constituted as a convergent-divergent nozzle mounted on and forming an extension of the bore of the tube and provided with lateral air-inlet passages spaced around the wall of the

30 nozzle-head and opening into the bore thereof at a zone spaced downstream of the throat of the nozzle. Preferably, the axes of the air-inlet passages are oblique to the axis

35 of the nozzle, said axes of the passages lying on the surface of an imaginary cone converging in the direction of steam flow and having its apex within the divergent

40 portion of the nozzle. In its retracted position, the nozzle-head is wholly accommodated within the forward portion of the body, there being provided between the interior of the body and the exterior of the nozzle-head an annular air chamber through

45 which air passes to the air-inlet passages and of which the lateral wall is perforated

with obliquely inclined atmospheric air-inlet ports.

Steam is conducted to the nozzle-head through the tube, the steam being admitted to an annular steam chamber within the 50 body and surrounding part of the tube, and the tube being provided with lateral steam inlet ports which, as the tube is advanced to operative position, enter the steam chamber and permit inflow of steam to the 55 bore of the tube.

The wall of the forward end portion of the body is formed with a lateral skew slot engaged by a follower attached to the nozzle-head so that, as the tube is advanced and 60 retracted, the tube and the nozzle-head are partially rotated about the longitudinal axis of the steam blower and the steam-air jets issuing from the nozzle-head thus correspondingly rotated. 65

For operating the blower there is provided at the rear of the blower a spring-urged piston connected to the rear of the tube and sliding within a cylinder formed as a rear 70 extension of the body, said cylinder affording at its rear end an operating oil chamber.

The spring acts on a piston rod and serves as a return spring for the piston and blower tube.

As will be understood, when pressure oil 75 is admitted to the oil chamber the tube and the nozzle-head are displaced forwardly by the piston, and, when the oil is released from said chamber, the tube and the nozzle-head are retracted by the return spring. 80

A plurality of soot blowers may be operated selectively from a control station including a motor-operated oil pump which delivers oil through a two-way valve to a header provided with valves piped to the 85 several blowers, the two-way valve being geared to the pump so as to connect the selected blower alternately to pressure and exhaust as required.

A soot blower according to the invention 90

[Price 3s. 0d.]

is illustrated in the accompanying drawing in which Fig. 1 is a axial section; Fig. 2 is a detail plan view; and Fig 3 is a schematic view of a control station.

5 Referring to the drawing, the soot blower shown is equipped with a projectile and retractile nozzle-head 10 and is so devised that, in the operation of the blower, a substantial flow of atmospheric air is induced  
10 into the steam flow through the head 10, for admixture therein with the steam, and for discharge therewith from the nozzle-head 10 through outlet orifices 10a in the nose of the nozzle-head.

15 The blower includes an externally flanged tubular body 11 within which is guided, for axial advancing and retracting movements, a tube 12 carrying on its forward end the nozzle-head 10, which latter is  
20 constituted as a convergent-divergent nozzle 13 mounted on and forming an extension of the bore of the tube 12 and provided with lateral air-inlet passages 14 spaced around the wall of the nozzle-head and opening  
25 into the bore thereof at a zone spaced downstream of the throat of the nozzle 13. The axes of the air-inlet passages 14 are oblique to the axis of the nozzle, said axes of the passages lying on the surface of an  
30 imaginary cone converging in the direction of steam flow and having its apex within the divergent portion of the nozzle 13. In its retracted position, the nozzle-head 10 is wholly accommodated within the forward  
35 portion of the body 11, there being provided between the interior of the body 11 and the exterior of the nozzle-head 10 an annular air chamber 15 through which air passes to the air-inlet passages 14 and of which the lateral  
40 wall is perforated with obliquely inclined atmospheric air-inlet ports 15a. In the advanced or operative position of the nozzle-head 10, the orificed nose portion of the nozzle-head protrudes beyond the forward  
45 end of the body 11, but the air-inlet passages 14 of the nozzle-head are still located within the air chamber 15.

50 Steam is conducted to the nozzle-head through the tube 12, the steam being admitted to an annular steam chamber 16 within the body 11 and surrounding part of the tube 12, and the tube 12 being provided with lateral steam inlet ports 17 which, as the tube is advanced to operative position,  
55 enter the steam chamber 16 and permit inflow of steam to the bore of the tube 12.

60 The wall of the forward end portion of the body 11 is formed with a skew slot 18 engaged by a follower 19 attached to the nozzle-head so that, as the tube 12 is advanced and retracted, the tube and the nozzle-head 10 are partially rotated about the longitudinal axis of the blower and the steam-air jets issuing from the orifices 10a  
65 thus correspondingly rotated.

For operating the blower there is provided at the rear of the blower a piston 20 connected to the rear end of the tube 12 and sliding within a cylinder 21 formed as a rear extension of the body 11, said cylinder  
70 21 affording at its rear end an operating oil chamber 22. 23 denotes a helical compression spring which serves as a return spring for the piston and blower tube and which acts on a piston rod 24 attached to  
75 the piston 20. As will be understood, when pressure oil is admitted to the chamber 22 the tube 12 and the nozzle-head 10 are displaced forwardly by the piston 20, and when the oil is released from the chamber 22,  
80 the tube 12 and the nozzle-head 10 are retracted by the spring 23.

A plurality of these soot blowers may be operated selectively from a control station (Fig. 3) including a motor-operated oil pump  
85 25 which delivers oil through a two-way valve 26 to a header 27 provided with valves 28 piped to the piston chambers of the several blowers. The two-way valve 26 is geared to the pump 25 so as to connect the  
90 selected blower or blowers alternately to pressure and exhaust as required. The steam supply to the blowers may be controlled by a common stop valve 29 at the control station.  
95

What we claim is:—

1. A soot blower for a steam generator including a projectile and retractile nozzle-head wherein, in the operation of the blower, a substantial flow of air is induced into the  
100 steam flow through the head, for admixture therein with the steam, and for discharge therewith from the nozzle-head.

2. A soot blower as claimed in Claim 1 including a tubular body within which is  
105 guided, for axial advancing and retracting movements, a tube carrying on its forward end the nozzle-head, which latter is constituted as a convergent-divergent nozzle mounted on and forming an extension of  
110 the bore of the tube and provided with lateral air-inlet passages spaced around the wall of the nozzle-head and opening into the bore thereof at a zone spaced downstream of the throat of the nozzle.  
115

3. A soot blower as claimed in Claim 2 wherein the axes of the air-inlet passages are oblique to the axis of the nozzle, said axes of the passages lying on the surface of  
120 an imaginary cone converging in the direction of steam flow and having its apex within the divergent portion of the nozzle.

4. A soot blower as claimed in Claim 2 wherein, in its retracted position, the nozzle-head is wholly accommodated within the  
125 forward portion of the body, there being provided between the interior of the body and the exterior of the nozzle-head an annular air chamber through which air passes to the air-inlet passages and of which  
130

the lateral wall is perforated with obliquely inclined atmospheric air inlet ports.

5 A soot blower as claimed in Claim 1 wherein steam is conducted to the nozzle-head through the tube, the steam being admitted to an annular steam chamber within the body and surrounding part of the tube, and the tube being provided with lateral steam inlet ports which, as the tube is advanced to operative position, enter the steam chamber and permit inflow of steam to the bore of the tube.

10 6. A soot blower as claimed in Claim 1 wherein the wall of the forward end portion of the body is formed with a lateral skew slot engaged by a follower attached to the nozzle-head so that, as the tube is advanced and retracted, the tube and the nozzle-head are partially rotated about the longitudinal axis of the blower and the steam-air jets issuing from the nozzle-head thus correspondingly rotated.

20 7. A soot blower as claimed in Claim 1 wherein for operating the blower there is provided at the rear of the blower a spring-

urged piston connected to the rear end of the tube and sliding within a cylinder formed as a rear extension of the body, said cylinder affording at its rear end an operating oil chamber.

8. A plurality of soot blowers as claimed in Claim 1 adapted to be operated selectively from a control station including a motor-operated oil pump which delivers oil through a two-way valve to a header provided with valves piped to the several blowers, the two-way valve being geared to the pump so as to contact the selected blower or blowers alternately to pressure and exhaust as required.

9. A soot blower constructed and arranged for operation substantially as herein-described with reference to the accompanying drawing.

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#### PROVISIONAL SPECIFICATION.

#### Improvements in or relating to Soot Blowers for Steam Generators.

45 We, COCKBURNS LIMITED, a British Company, of Clydesdale Engineering Works, Cardonald, Glasgow, S.W.2, do hereby declare this invention to be described in the following statement :—

50 This invention relates to improvements in soot blowers for steam generators and has for an object to provide an improved construction of soot blower devised to operate with economy in steam consumption.

55 A soot blower according to the invention is equipped with a projectile and retractile nozzle-head adapted to function as a steam-operated air injector whereby, in the operation of the blower, a substantial flow of air is induced into the steam flow through the head, for admixture therein with the steam, and for discharge therewith from the nozzle-head.

65 The blower may include an externally flanged tubular body within which is guided, for axial advancing and retracting movements, a tube carrying on its forward end the nozzle-head, which latter is preferably constituted as convergent-divergent nozzle mounted on and forming an extension of the bore tube and provided with lateral air-inlet passages spaced around the wall of the nozzle and opening into the bore thereof at a zone spaced downstream of the throat of the nozzle. Preferably, the axes of these air-inlet passages are oblique to the axes of the nozzle, said axes of the passage lying on

the surface of an imaginary cone converging in the direction of steam flow and having its apex within the divergent portion of the bore of the nozzle. In its retracted position, the nozzle-head is wholly accommodated within the forward portion of the body, there being provided between the interior of the body and the exterior of the nozzle-head an annular air chamber through which air passes to the air-inlet passages and of which the lateral wall is perforated with obliquely inclined atmospheric air-inlet ports. In the advanced or operative position of the nozzle-head, the front nose portion of the nozzle protrudes beyond the forward end of the body, but the air-inlet passages of the nozzle are still located within the annular air chamber.

Steam is conducted to the nozzle-head through the tube, the steam being admitted to an annular steam chamber within the body and surrounding part of the tube, and the tube being provided with lateral steam inlet ports which, as the tube is advanced to operative position, enter the steam chamber and permit inflow of steam to the bore of the tube.

The wall of the rear end portion of the body may be formed with a lateral helical slot engaged by a follower attached to the tube so that, as the tube is advanced and retracted, the tube and the nozzle-head are partially rotated about the longitudinal axis of the blower and the steam-air jet issuing

from the nozzle-head thus correspondingly rotated.

For operating the blower there may be provided at the rear of the blower a piston connected by a piston rod with the rear end of the tube and sliding within a cylinder formed as a rear extension of the body, said cylinder affording at its rear end an operating oil chamber, and accommodating within its forward portion a helical compression spring which serves as a return spring for the piston and blower tube. As will be understood, when pressure oil is admitted to the cylinder the tube and the nozzle-head are displaced forwardly by the piston, and, when the oil is released from the cylinder, the tube and the nozzle-head are retracted by the return spring.

A plurality of soot blowers may be operated selectively from a control station including a motor-operated oil pump which delivers oil through a two-way valve to a header provided with valves piped to the oil cylinders of the several blowers. The two-way valve is geared to the pump so as to connect the selected blowers alternately to pressure and exhaust as required. The steam supply to the blowers may be controlled by a common stop valve at the control station.

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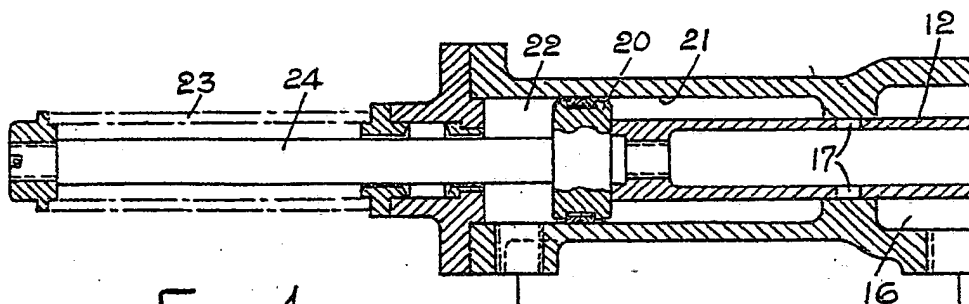


FIG. 1

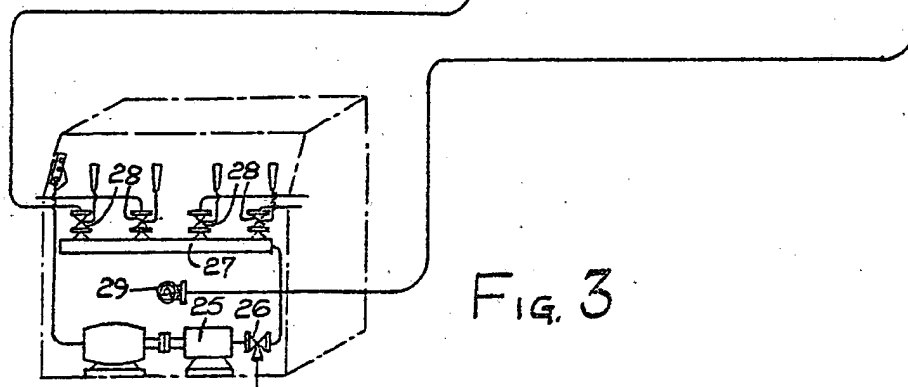


FIG. 3

762,323 COMPLETE SPECIFICATION

1 SHEET This drawing is a reproduction of  
the Original on a reduced scale.

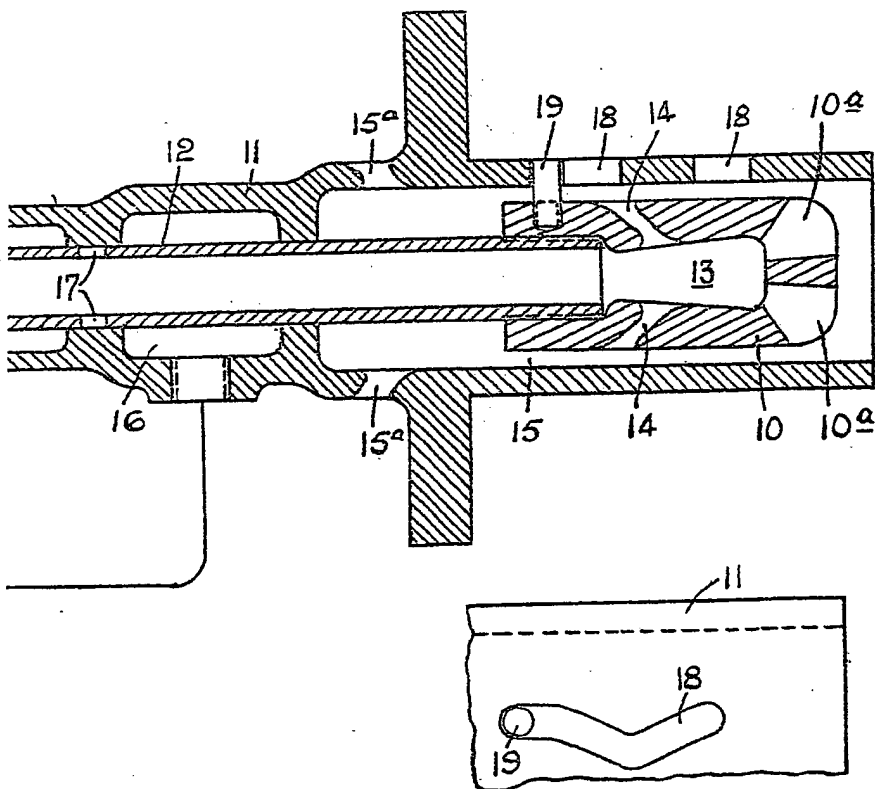


FIG. 2



